



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| | | |
|--|---|---|
| Applicant's or agent's file reference C02028WO | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IEA/416) | |
| International application No. PCT/EP2003/009015 | International filing date (day/month/year) 14 August 2003 (14.08.2003) | Priority date (day/month/year) 24 August 2002 (24.08.2002) |
| International Patent Classification (IPC) or national classification and IPC C07F 15/00 | | |
| Applicant COVION ORGANIC SEMICONDUCTORS GmbH | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

| | |
|--|--|
| Date of submission of the demand 18 March 2004 (18.03.2004) | Date of completion of this report 29 July 2004 (29.07.2004) |
| Name and mailing address of the IEA/EP | Authorized officer |
| Facsimile No. | Telephone No. |

Form PCT/IEA/409 (cover sheet) (July 1998)

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP2003/009015

I. Basis of the report

1. With regard to the elements of the international application:*

- ☐ the international application as originally filed
- ☒ the description: _____, as originally filed
 pages _____ 1-27 _____, filed with the demand
 pages _____, filed with the letter of _____
 pages _____
- ☒ the claims: _____, as originally filed
 pages _____ 1-22 _____, as amended (together with any statement under Article 19
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the drawings: _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description: _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item. These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig. _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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International application No.

PCT/EP2003/009015

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

XII. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 1-22 (PARTLY)

because:

☐ the said international application, or the said claims Nos. _____
relate to the following subject matter which does not require an international preliminary examination (specify):

☐ the description, claims or drawings (indicate particular elements below) or said claims Nos. _____
are so unclear that no meaningful opinion could be formed (specify):

☐ the claims, or said claims Nos. _____ are so inadequately supported
by the description that no meaningful opinion could be formed.

☒ no international search report has been established for said claims Nos. 1-22 (PARTLY)

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

International application No.

PCT/EP2003/009015

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
☐ paid additional fees.
☐ paid additional fees under protest.
☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
☒ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☐ all parts.
☒ the parts relating to claims Nos. 1-22 (PARTLY)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/EP 03/09015

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

| | | | | | |
|----|-------------------------------|--------|----------------------------------|-----|--|
| 1. | Statement | | | | |
| | Novelty (N) | Claims | 2, 3, 7, 9, 11, 13-18 | YES | |
| | | Claims | 1, 4-6, 8, 10, 12, 19-22 | NO | |
| | Inventive step (IS) | Claims | | YES | |
| | | Claims | 2, 3, 7, 9, 11, 13-18 | NO | |
| | Industrial applicability (IA) | Claims | 1-22 | YES | |
| | | Claims | | NO | |

2. Citations and explanations

see Supplemental Box

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/EP 03/09015Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of I, II, III, IV, V

Lack of unity of invention

The present report considers the following search report citations (D); the same numbering will be used throughout the procedure:

- D1: WO 02/060910 A (COVION ORGANIC SEMICONDUCTORS; BECKER HEINRICH (DE); SPREITZER HUB) 8 August 2002 (2002-08-08)
- D2: LO S-C ET AL: "GREEN PHOSPHORESCENT DENDRIMER FOR LIGHT-EMITTING DIODES" ADVANCED MATERIALS, VCH VERLAGSGESELLSCHAFT, WEINHEIM, DE, Vol. 14, No. 13/14, 4 July 2002 (2002-07-04), pages 975-979, XP001130567 ISSN: 0935-9648
- D3: MARKHAM J P J ET AL: "HIGH-EFFICIENCY GREEN PHOSPHORESCENCE FROM SPIN-COATED SINGLE-LAYER DENDRIMER LIGHT-EMITTING DIODES" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, Vol. 15, No. 80, 15 April 2002 (2002-04-15), pages 2645-2647, XP001074763 ISSN: 0003-6951
- D4a: WO 02/44189 A (CANON KABUSHIKI KAISHA, JAPAN) 6 June 2002 (2002-06-06)
- D4b: EP-A-1348711.

The present application suffers from lack of unity of invention *a posteriori* since the complexes excluded by the disclaimer are already known from documents D2 and D3 (see figure 1 in each of D2 and D3). Document D4 (see table 1, complexes no. 3, 8 and 10) discloses non-excluded complexes.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/EP 03/09015Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of I, II, III, IV, V

The documents further indicate that the complexes are suitable for OLED applications. Since document D4a is a Japanese-language application, reference is made instead to document D4b (see D4b, claims 21, 41-43, 45-47).

Documents D2 to D4 are therefore part of the same technical field as the present application. The use of the metal chelates of the formulas (I), (Ia), (II), and (IIa) in electroluminescence and/or phosphorescence devices therefore cannot be considered a feature, within the meaning of PCT Rule 13, that links the different structures (I)-(IIa) of the metal complexes. Since there is no other feature which could take on this role, the application suffers from lack of unity of invention *a posteriori*.

The present application adds new complexes to four different classes of metal chelates. The new metal chelates are based on compounds of formulas (I), (II), (Ia) and (IIa). As can be seen from claims 1 and 2, the applicant was not able to classify these four groups of metal chelates hierarchically but merely juxtaposed them. Owing to the structural differences of the metal chelates of claims 1 and 2 it was therefore not possible to summarize them in one common formula.

Consequently, lack of unity of invention also prevails *a priori*.

The different inventions 1 to 4 are defined in the search report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP 03/09015

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of I, II, III, IV, V

Non-establishment of opinion with regard to novelty,
inventive step and industrial applicability

The search was carried out for the first invention, since no additional fees were paid in response to the invitation to do so. Invention 1 is also the subject of the present report.

Document D4a is considered the closest prior art (see the statement regarding document D4b in Box IV above). Consequently, claims 1, 4-6, 8, 10, 12 and 19-22 (invention 1) are not novel.

The remaining, novel, claims are suggested by the additional information contained in document D4b.

In addition, document D1 is relevant to the establishment of an opinion with regard to inventive step. Claim 13 of document D1 discloses Rh and Ir complexes having the following features:

Application, Claim 1, formula (I) D1, Claim 13

| | | |
|---|--|--|
| M | Rh, Ir | Ir |
| X | - | - |
| Y | R-C=C-R | -C=C- |
| R | same or different | same or different |
| | H, F, Cl NO ₂ , CN, C1-C20 alkyl or O-alkyl | H, F, Cl NO ₂ , CN, C1-C20 alkyl or O-alkyl |
| | wherein non-adjacent | wherein non-adjacent |
| | CH ₃ is optionally replaced by | CH ₃ is optionally |

Form PCT/EP 03/09015 (Supplemental Box) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/EP 03/09015Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of I, II, III, IV, V

| | | |
|----|---|--|
| | O, S, NR1 or CONR2 and 1 or more H can be replaced by F or R is a C4-C14 aryl or heteroaryl group which can be substituted by one or more non-aromatic R groups, and multiple R groups can form a further monocyclic or polycyclic ring system. | replaced by O, S, NR1 or CONR2 and 1 or more H can be replaced by F or R is a C4-C14 aryl or heteroaryl group which can be substituted by one or more non-aromatic R groups, and multiple R groups can form a further monocyclic or polycyclic ring system. |
| At | C1-C40 aryl or heteroaryl group | C4-C14 aryl or heteroaryl group |
| Q | the same or different, F, Cl, Br, I, CN, COOH, NH ₂ , NO ₂ , SO ₃ H, SiR ₃ , C1-C20 alkyl or O-alkyl wherein non-adjacent CH ₂ is optionally replaced with O, S, CO, CO ₂ , OCO, NR1, N(R ₂ R ₃)"A" or CONR4 and 1 or more H can be replaced by F or is a C4-C14 aryl or heteroaryl group which can be substituted with one or more non-aromatic R groups. | the same or different, H, F, Cl NO ₂ , CN, C1-C20 alkyl or O-alkyl wherein non-adjacent CH ₂ is optionally replaced with O, S, NR1 or CONR2 and 1 or more H can be replaced by F or is a C4-C14 aryl or heteroaryl group which can be substituted with one or more non-aromatic R groups. |
| a | 0, 1, 2, 3, 4 | 0, 1, 2, 3, 4 |
| b | 0, 1, 2, 3 | 0, 1, 2 |
| c | 0-15 | 0 or present. |

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/EP 03/09015Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: I, II, III, IV, V

evident from the very title of documents D2 and D3.

After looking at the priority documents, the examiner found that all the claims are supported by the priority. Therefore, the P(X) and E documents in the search report are not relevant to the question whether the claims meet the requirements of PCT Article 33(1).

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